

Listing of Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method of noncontact dispensing a conformal coating material onto a ~~surface of a substrate~~ having electronic devices mounted thereon ~~without applying a mask to the substrate, the method~~ comprising:

providing a positioner supporting a jetting valve comprising a valve closure element, a valve seat and a nozzle, the positioner being operable to move the jetting valve;

moving the jetting valve with respect to the substrate; and

while moving the jetting valve, applying droplets of conformal coating material to ~~the surface~~ only areas of the substrate substantially conforming to a reverse of a mask, thereby eliminating a requirement of applying a mask to the substrate prior to dispensing the conformal coating thereon by iteratively

initiating a flow of the conformal coating material through the valve seat and into the nozzle,

terminating the flow of conformal coating material through the valve seat by causing the valve closure element to engage the valve seat, ~~to cut off the flow of coating material through the valve seat, propelling a flow of wherein~~ the conformal coating material downstream of the valve seat continues to flow through the nozzle with a forward momentum, and

breaking the flow of the conformal coating material from the nozzle by using its forward momentum to form a droplet of the conformal coating material, and applying the droplet to coat a maximum area on the substrate of about 200 square micrometers.

2. Cancelled.

3. (Currently Amended) A method of noncontact dispensing a conformal coating material onto solder contacts on a surface of a substrate without applying a mask to the substrate, the method comprising:

providing a positioner supporting a jetting valve comprising a valve closure element, a valve seat and a nozzle, the positioner being operable to move the jetting valve in at least two axes of motion;

moving the jetting valve with respect to the substrate; and

while moving the jetting valve, applying droplets of conformal coating material only to the solder contacts, thereby eliminating a requirement of applying a mask to the substrate prior to dispensing the conformal coating thereon by iteratively

initiating a flow of the conformal coating material through the valve seat and into the nozzle,

terminating the flow of conformal coating material through the valve seat by causing the valve closure element to engage the valve seat, ~~to cut off the flow of coating material through the valve seat, propelling a flow of wherein~~ the conformal coating material downstream of the valve seat continues to flow through the nozzle with a forward momentum, and

breaking the flow of the conformal coating material from the nozzle by using its forward momentum to form a droplet of the conformal coating material, and applying the droplet to coat a maximum area on the substrate of about 200 square micrometers.

4. (Currently Amended) A method of applying a conformal coating material ~~to a surface onto a substrate having electronic devices mounted thereon without applying a mask to the substrate~~, the method comprising:

providing a positioner supporting a jetting valve comprising a valve closure element, a valve seat and a nozzle, the positioner being operable to move the jetting valve with respect to X, Y and Z axes of motion;

moving the jetting valve with respect to one of the X and Y axes of motion; and

while moving the jetting valve, creating droplets of the conformal coating material in a first linear pattern on the surface by iteratively

initiating a flow of the conformal coating material through the valve seat and into the nozzle,

terminating the flow of conformal coating material through the valve seat by causing the valve closure element to engage the valve seat, to cut off the flow of coating material through the valve seat, propelling a flow of wherein the conformal coating material downstream of the valve seat continues to flow through the nozzle with a forward momentum,

breaking the flow of the conformal coating material from the nozzle by using its forward momentum to form a droplet of the conformal coating material,

applying the droplet to coat a maximum area on the substrate of about 200 square micrometers, and

further applying the droplet droplets of the conformal coating material to the surface only areas of the substrate substantially conforming to a reverse of a mask, thereby eliminating a requirement of applying a mask to the substrate prior to dispensing the conformal coating thereon.

5. (Previously Submitted) The method of claim 4 wherein moving the jetting valve further comprises moving the jetting valve in a first angular axis of motion about one of the X, Y and Z axes of motion.

6. (Previously Submitted) The method of claim 5 further comprising moving the jetting valve in a second angular axis of motion about a different one of the X, Y and Z axes of motion.

7. (Currently Amended) The method of claim 4 further comprising:

(a) moving the jetting valve through an increment along an other of the X and Y axes of motion;

(b) moving the jetting valve along the one of the X and Y axes of motion; and

(c) while moving the jetting valve, creating droplets of the conformal coating material in a second linear pattern on the substrate contiguous with the first linear pattern by iteratively

initiating a flow of the conformal coating material through the valve seat and into the nozzle,

terminating the flow of conformal coating material through the valve seat by causing the valve closure element to engage the valve seat, ~~to cut off the flow of coating material through the valve seat, propelling a flow of wherein~~ the conformal coating material downstream of the valve seat continues to flow through the nozzle with a forward momentum,

breaking the flow of the conformal coating material from the nozzle by using its forward momentum to form a droplet of the conformal coating material,

applying a droplet to coat a maximum area on the substrate of about 200 square micrometers, and

further applying the droplet droplets of the conformal coating material to the surface only areas of the substrate substantially conforming to a reverse of a mask, thereby eliminating a requirement of applying a mask to the substrate prior to dispensing the conformal coating thereon.

8. (Currently Amended) The method of claim 7 further comprising coating an area on the ~~surface~~ substrate by iterating steps (a) through (c), wherein the area coated substantially conforms to a reverse of a mask such that the requirement of applying a mask to the substrate prior to dispensing the conformal coating thereon is still eliminated.

9. (Original) The method of claim 4 wherein applying the droplet of conformal coating material has a maximum volume of 5 nanoliters.

10. (Currently Amended) The method of claim 4 further comprising iterating the steps of ~~causing initiating, terminating,~~ breaking and applying at a rate of about 100 droplets per second to continuously apply the first linear pattern of conformal coating material to the substrate.

11. Cancelled.

12. (New) A method of noncontact dispensing a conformal coating material onto a substrate having electronic devices mounted thereon without applying a mask to the substrate, the method comprising:

providing a positioner supporting a jetting valve comprising a nozzle, a valve seat, and a valve closure element having an initial position against the valve seat, the positioner being operable to move the jetting valve;

moving the jetting valve with respect to the substrate; and

while moving the jetting valve, dispensing conformal coating material onto only areas of the substrate substantially conforming to a reverse of a mask, thereby eliminating a requirement of applying a mask to the substrate prior to dispensing the conformal coating thereon by

moving the valve closure element away from the valve seat to allow the conformal coating material to flow to a location between the valve closure element and the valve seat,

returning the valve closure element back to the initial position to dispense an initial amount of the conformal coating material through the nozzle, the initial amount being in the form of a droplet, and

applying the droplet to coat a maximum area on the substrate of about 200 square micrometers, and

dispensing additional droplets of the conformal coating material by repeating the steps moving and returning the valve closure element.

13. (New) The method of claim 12 wherein the jetting valve is configured to dispense the conformal coating material at a rate of 100 or more droplets per second.

14. (New) The method of claim 13 wherein dispensing additional droplets of the conformal coating material comprises repeating the moving and returning steps at a rate sufficient to dispense 100 or more droplets per second.

15. (New) The method of claim 12, wherein the positioner is operable to move the jetting valve with respect to X, Y, and Z axes of motion, and wherein moving the jetting valve further comprises moving the jetting valve in a first angular axis of motion about the X, Y, and Z axes of motion.

16. (New) The method of claim 13 further comprising moving the jetting valve in a second angular axis of motion about a different one of the X, Y, and Z axes of motion.